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ABSTRACT

"Trek 21: Educating Teachers as Agents of Technological Change," is a 3-year PT3 implementation grant from the United States Department of Education designed to build the capacity in teacher educators (teacher education faculty, professional development school faculty, pre-service interns) to integrate technology into their teaching. The goal of Trek 21 is to prepare educators to use and integrate instructional technologies teaching and learning. This paper discusses shifts in the development between year one and year two of teachers' Web-based instructional units, with a focus on the degree to which year two units feature greater student engagement using networked technologies. Through a detailed discussion of project events and participant outcomes, strategies of the Trek 21 Model of Professional Development process are illustrated. (Contains 27 references.) (Author/AEF)

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Trek 21: Building Teachers' Capacity To Develop IT-Integrated Units With Student Engagement

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Abstract

Trek 21 is a 3-year PT3 implementation grant from the United States Department of Education designed to build the capacity in teacher educators (teacher education faculty, Professional Development School faculty, pre-service interns) to integrate technology into their teaching. The goal of Trek 21 is to prepare educators to use and integrate instructional technologies (ITs) for teaching and learning. This paper discusses shifts in the development between year one and year two of teachers' web-based instructional units, with a focus on the degree to which year two units feature greater student engagement using networked technologies. Through a detailed discussion of project events and participant outcomes, strategies of the Trek 21 Model of Professional Development process are illustrated.

Introduction

The National Commission on Teaching and America's Future (1996) asserts that pre-service teacher education has the potential for the greatest influence in enhancing the learning opportunities of children. The report goes on to state that excellent pre-service teacher education requires bringing together the contexts of schools with the preparation of teachers. This preparation must be adequate and sustained in the professional practice of teachers.

Current instructional technologies offer students and teachers access to information and multiple modes of knowledge construction. By design, these new technologies make this method of knowledge construction largely individualistic and demand changes in teaching and learning environments so as to effectively integrate them into the instructional process. It is essential for new teachers (pre-service) to develop new perspectives on instructional design and new instructional technology skills within settings and environments in which these approaches are modeled. Students exiting teacher preparation programs must have acquired the ability to integrate new and future instructional technologies, and must have gained the skills necessary to adjust to teaching environments where limited technology infrastructure and capacity exist.

Preparing Tomorrow's Teachers to Use Technology (PT3) and Trek 21

PT3 is an initiative of the United States Department of Education. Grants from the PT3 Initiative provide funding for innovative programs to develop technologically proficient educators who are well prepared to meet the needs of 21st century learners. "Trek 21: Educating Teachers as Agents of Technological Change" is a 3-year PT3 implementation grant from the U. S. Department of Education designed to prepare educators involved in West Virginia University's five-year teacher preparation program to integrate instructional technologies (ITs) into their teaching. The grant was awarded to the College of Human Resources and Education at West Virginia University (WVU) in 1999.

The Trek 21 model of teacher professional development includes host teachers in West Virginia University's Professional Development Schools (PDS), faculty from WVU's College of Human Resources and Education (HR&E), and student interns in their fifth year of the teacher preparation program. Trek 21 looks to impart lasting change in the culture of teacher practice. To help accomplish this change, the design of the Trek 21 model includes an annual cycle of professional development events: Summer Institutes for WVU faculty (seven days) and PDS teachers (three weeks), school site visits, mini conferences, and continuity meetings in the fall and spring.

Project Design

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The Trek 21 model is an annual cycle of events sequenced in such a manner so as to ensure long-term adoption of new practice, continuous support and feedback, and sustainability beyond the project.

Summer institutes

A seven-day technology integration summer institute for university faculty and a three-week technology integration summer institute for PDS host teachers begins each year of the Trek 21 project cycle. These Institutes address genres of instructional technology applications (Harris, 1998), target technical training, and prepare instructional technology materials and resources necessary for immediate integration into classroom instruction. The final outcome is a teacher-developed, web-based instructional unit, which is implemented in the fall by the teacher in collaboration with a pre-service student intern.

Continuity meetings/site visits

Following the summer institutes, Trek 21 holds continuity meetings with PDS faculty once each semester (fall and spring) to address issues related to the successful integration of instructional technologies at their location. School site visits occur throughout the year to provide continued support and gather data on unit implementation and local concerns.

Mini conferences

Scheduled to occur twice each academic year, a mini-conference is held in partnership with West Virginia's "Technology, Teacher Education, Tomorrow" (T3) non-profit organization whose mission is to share best practices, receive technology enhancement training, and deliver presentations of activities related to the integration of instructional technologies. These conferences serve as our opportunity for state-wide dissemination of Trek 21 research results and presentation by participants of best practice where the integration of ITs is central.

Summary of Year One Events and Outcomes

Participants for the first year included 47 PDS teachers who supervised pre-service interns during the fall semester. Of the 47 teachers, 17 were elementary school teachers, 19 were middle school teachers, and 11 were high school teachers. These teachers attended one of three summer institutes, each lasting three weeks. The Trek 21 Professional Development process for year one has been examined along multiple foci and reported (Adams, Dunham, Wells, & Shamburgh, 2001). Initial findings profiled K-12 participants as preferring a teacher-centered approach, providing minimal written details in lesson plans, and depicting themselves as low-level computer users with minimal integration levels of instructional technology. Analysis of lessons submitted by teachers at the beginning of the PDS Summer Institutes revealed 30% (14) of the teachers had a complete lesson(s), 32% (15) had some lesson plan features, and 38% (18) did not have a lesson plan.

An externally developed rubric guided the evaluation of participants' units, which resulted in an initial low percentage of posted teacher units. Following subsequent revisions during the fall continuity meeting, all teachers' units were posted to the Trek 21 web site. The web-based units were typically structured as teacher sites, with a limited number distinguishing between teacher and student activity. During year one, not enough emphasis was placed on the development of student-centered units and, as a result, learning activities were frequently depicted in lessons using traditional teacher-centered approaches. Although some ITs were integrated, particularly chat rooms and web boards, initially the units lacked the procedural details needed in order for other teachers and students to utilize them as the participants intended.

The most frequent learning strategies employed by teachers in their units involved a) problem solving using information retrieval and desktop publishing technologies, b) concept scaffolding with PowerPoint presentations and the Internet, and c) discovery learning through information retrieval and Internet searches. IT applications most utilized by teachers were presentations (32 activities), information retrieval (29), and Internet searches (17).

Final evaluations of teachers' web-based units indicated web design was an area that needed to be more fully addressed early in the development process. The most frequently occurring web design issues were: providing needed structure for the learning activities and information to communicate the overall intent, giving individual lessons descriptive titles, reducing scrollable text, documenting individual lessons on separate pages, reducing animated GIFs, improving background/text contrast, addressing web browser differences, providing appropriate

navigation and consistent use of navigation icons. Addressing these issues with teachers earlier in the development of their web units would provide the design and software foundation they needed to design well from the start.

The first year of professional development with PDS teachers revealed the need to provide teachers with a clearer picture of the overall intent of their web-based unit. For some participants, translating what they currently do in the classroom into web-based student-centered activities was a major shift. Feedback from the summer 2001 institutes indicated that providing greater clarity in our expectations of teachers, their obligations and responsibilities, would markedly improve the instructional outcomes of the project. Furthermore, year one findings indicated that by more clearly defining terms such as "lesson" and "unit", incorporating strong examples of lesson templates, and providing consistency between the evaluation tools and instructional strategies employed, the professional development process would improve.

The importance of sufficient staff, proper facilities, and ample time is well understood. During the Trek 21 professional development process teachers expressed the need for as much time as possible for unit development. In addition year one feedback revealed that during the development time teachers require both consistently available technical assistance and sufficient pedagogical expertise as it relates to the instructional technologies integrated. This demand for both technical and instructional expertise presented a significant staffing challenge during year one institutes.

Year Two Design Changes

Based on year two experiences, design changes were implemented to address specific preparation and training areas in need of improvement. Improvements such as clearly conveyed expectations, using common terminology understood by all participants, and indicating that units would consist of a minimum of five lessons enabled teachers to plan well for the institute. Their planning was also improved by asking them to submit units they had taught many times before, they felt very comfortable with, and that they would be teaching in the fall.

Re-designed unit/lesson templates provided participants with a consistent structure and common terminology upon which all their units could be developed and evaluated. The significance of the re-designed templates was the way they guided teachers toward separation of student and teacher activities, helping to emphasize the goal of creating student-centered lessons. As a result, prior to arriving at the summer institute most of the participants' units were pedagogically complete and more ready for instructional technology integration. To address some of the web design issues found to be problematic in year one, participants were encouraged to begin their web page development using Trek 21 pre-designed web page templates. These web page templates included invisible tables, and contained consistent design and navigation features that enabled participants to concentrate on the application of instructional technologies rather than web page design. Participants were evaluated using a detailed, internally developed rubric that aligned directly with requirements designed into the unit/lesson and web page templates they all used when submitting application.

The evaluation of year one institutes identified the need for classroom expertise during training, which led to the incorporation of prior teacher participants as Instructional Leaders (ILs) as part of the Trek 21 Professional Development process. The Instructional Leaders served as master teachers to help ground the summer institutes by assisting new project participants with pedagogical issues, and by providing them with details on how to incorporate the three genres of instructional technology known to promote student engagement (Harris, 1998). The presence of Instructional Leaders allowed other Trek 21 personnel to focus on technical support, and resulted in the inclusion of additional (optional) breakout sessions to meet the diverse needs of novice, intermediate, and expert participants.

The Trek 21 cycle of events includes fall and spring continuity meetings and informal site visits in an effort to provide opportunities for further skill development and technical support. Each continuity meeting offers a full day of development time for teachers to revise their units with the convenience of a support staff readily available to provide assistance. The arrangement of informal site visits throughout the year allows Trek 21 staff members to visit each school for follow-up sessions with participants, assisting participants with problems and becoming familiar with their classroom environment. Additionally, selected project participants and Trek 21 staff members serve as part of a Trek 21 Leadership and Planning Committee, which reflect on prior institute processes and offer suggestions for revision.

Summary of Year Two Events and Outcomes

Participants in year two consisted of 27 teachers selected from the Professional Development Schools within the five West Virginia counties included in the Trek 21 project. This group was comprised of two preschool teachers, 17 elementary school teachers, four middle school teachers, and four high school teachers. These teachers

attended one three-week long Summer Institute. Information collected from a self-reporting survey indicated that the participants' technological skill levels varied from novice computer users to expert computer users.

Random sweeps and select comprehensive evaluations of the pre- and post-institute lessons illustrated the extent of student engagement in units. Although teachers' objectives and methods of assessment were not changed by technology integration, modifications were apparent when comparisons were made between pre- and post-institute lessons. Active student engagement in instructional procedures, instructional strategies, and integration of instructional technologies increased significantly in post-institute units, reflecting an increase in student-centered lesson design. For example, active student engagement included overt responses to instructional prompts such as sequencing cards, responding verbally in writing, retrieving information from a web site, and participating in discussion. Units developed during the summer 2001 institute clearly indicate the development of learner-centered units where student engagement was encouraged via the application of instructional technologies. Evidence of changes to instructional procedures included the existence of a motivating introduction, review information, new content, guided practice, independent practice, closure, and extensions. Changes to instructional procedures also included active student participation in procedures for student-centered activities located within teachers' units. Indicators of change in instructional strategies took the form of advanced organizers, whole group instruction, peer-mediated instruction, group discussion, active responding, problem-solving, research, inquiry, hands-on instruction, manipulatives, dramatic representation, journaling or writing, student presentations, or teacher demonstrations. Most participants included detailed information on the unit web pages on how to apply the instructional strategies in order to promote student engagement in the unit. Similarly, improvements in IT integrations involved extensions to activities such as Computer Aided Instruction drill-and-practice, simulation, educational games, word processing, information retrieval, internet access, e-mail, bulletin boards, listservs, authoring, multimedia development, desktop publishing, electronic presentations, video development, open lab access, or web page development. Overall, instructional technologies integrated by teachers provided a variety of avenues that promoted student engagement and participation in unit lessons.

In addition to meeting the need for greater assistance with project participants during the institute, Instructional Leaders guided participants on approaches to effective student engagement and the enhancement of teaching and learning via instructional technology. Because sufficient staff and facilities were available, participants were afforded flexible technical training whereby they could select individual IT training sessions based on integration potential within their unit lessons. By and large, Trek 21 participation resulted in unit modifications by teachers that unmistakably reflected strong student-centered lessons.

Implications for Year Three

Based on the overall results from years one and two, minor refinements will be incorporated into the design of year three to improve the Trek 21 Professional Development process. These refinements include clearer benchmarks pinpointed throughout the institute, perhaps in the form of a checklist, so participants can manage the amount of time spent on each section appropriately. Minor revisions to project documents such as the evaluation rubric and the unit/lesson templates will provide more precise guidelines for development. By offering concise directions and consistent expectations for all personnel involved in the project, participants will be more prepared to create web-based instructional units that integrate instructional technologies appropriately for student engagement.

Implications for year three focus on expanding the number of ITs by offering additional (optional) breakout sessions. During the first two days of the institute, exemplars will be identified that better illustrate the educational purpose of instructional technologies that will be offered throughout the institute. Teachers will be encouraged to choose from a pedagogical standpoint the instructional technologies they want to learn and integrate into their lessons. This will allow the participants to set their own limits on the new knowledge gained throughout the institute, so they are not overwhelmed with new possibilities.

Conclusions

The design of professional development with instructional technology as a focus is complex and requires clear guidelines, continual communication, and flexibility to meet individual teacher needs. The existence of clear instructions, consistent objectives, and defined expectations contribute to the overall success, particularly in the area of active student engagement. Factors such as collaboration with instructional leaders, the development of a Leadership and Planning Committee, and the use of an evaluation rubric by external reviewers have all led to the specification of clear and distinct roles and appropriate support mechanisms for project participants. Requiring

teachers to submit a unit with a minimum of five related lessons prior to the institute allowed us to begin the institute with illustrations and demonstrations of appropriate student engagement on unit web pages.

Results from the Trek 21 model of Professional Development clearly indicate an effective process for the development of learner-centered units facilitated through the integration and application of instructional technologies. Preliminary findings suggest that the implementation of Trek 21 participants' units will enhance student engagement in the instructional strategies, procedures, and integration of instructional technologies.

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